

WHAT IS CLAIMED IS:

Sub
A1
1. An image processing device for embedding digital watermark information in a gray-scale image, comprising:

input means for inputting gray-scale image data in which each pixel is formed of one component;

converting means for converting the format of the gray-scale image data into color image data in which each pixel is formed of a plurality of components; and

embedding means for embedding the digital watermark information in part of the components of the color image data obtained by said converting means.

2. An image processing device according to Claim 1, wherein each pixel in the color image data includes red, green, and blue components.

3. An image processing device according to Claim 1, wherein each pixel in the color image data includes brightness and chrominance components.

4. An image processing device according to Claim 1, wherein each pixel in the color image data includes at least yellow, magenta, and cyan components.

Sub
A:

5. An image processing device according to Claim 1, further comprising additional converting means for converting the color image data into other color image data in which each pixel includes brightness and chrominance components.

6. An image processing device according to Claim 3, further comprising encoding means for compressing and encoding the color image data including the brightness and the chrominance components.

7. An image processing device according to Claim 5, further comprising encoding means for compressing and encoding the color image data including the brightness and the chrominance components.

8. An image processing method for embedding digital watermark information in a gray-scale image, comprising the steps of:

inputting gray-scale image data in which each pixel is formed of one component;

converting the format of the gray-scale image data into color image data in which each pixel is formed of a plurality of components; and

embedding the digital watermark information in part of

the components of the color image data obtained in said converting step.

9. A storage medium having recorded thereon a computer-readable image processing program for embedding digital watermark information in a gray-scale image, said program comprising:

an inputting step of inputting gray-scale image data in which each pixel is formed of one component;

a converting step of converting the format of the gray-scale image data into color image data in which each pixel is formed of a plurality of components; and

an embedding step of embedding the digital watermark information in part of the components of the color image data obtained in said converting step.

10. An image processing device according to Claim 2, wherein said embedding means embeds the digital watermark information in the blue component.

11. An image processing device according to Claim 3, wherein said embedding means embeds the digital watermark information in the chrominance component.

12. An image processing device according to Claim 1,

Sub
A1
wherein said embedding means embeds a part of the digital watermark information in a part of the color image data in such a manner that the overall gray level of the image is not changed.

13. An image processing device according to Claim 7, wherein said embedding means embeds the digital watermark information in a manner such that the information is not lost when said encoding means compresses and encodes the color image data.

14. An image processing method according to Claim 8, wherein said converting step comprises converting the format of the gray-scale image data into color image data in which each pixel includes red, green, and blue components.

15. An image processing method according to Claim 14, wherein said embedding step comprises embedding the digital watermark information in the blue component.

16. An image processing method according to Claim 8, wherein said converting step comprises converting the format of the gray-scale image data into color image data in which each pixel includes brightness and chrominance components.

Sub
21

17. An image processing method according to Claim 16, wherein said embedding step comprises embedding the digital watermark information in the chrominance component.

18. An image processing method according to Claim 8, wherein said embedding step comprises embedding the digital watermark information in such a manner that the overall gray level of the image does not change.

19. A storage medium according to Claim 9, wherein said converting step comprises converting the format of the gray-scale image data into color image data in which each pixel includes red, green, and blue components.

20. A storage medium according to Claim 19, wherein said embedding step comprises embedding the digital watermark information in the blue component.

21. A storage medium according to Claim 9, wherein said converting step comprises converting the format of the gray-scale image data into color image data in which each pixel includes brightness and chrominance components.

22. A storage medium according to Claim 21, wherein said embedding step comprises embedding the digital

watermark information in the chrominance component.

23. A storage medium according to Claim 9, wherein said embedding step comprises embedding the digital watermark information in such a manner that the overall gray level of the image does not change.

24. An image processing device for embedding digital watermark information in a gray-scale image, comprising:

an input device that inputs gray-scale image data into said image processing device, wherein each pixel is formed of one component;

a color converter that converts the gray-scale image data into color image data in which each pixel is formed of a plurality of components;

a color component extracting unit that separates a part of the plurality of components from the remaining components of the color image data; and

an embedding unit that adds the digital watermark information to the part of the plurality of components separated by said color component extracting unit.

25. An image processing device according to Claim 24, further comprising:

a color component synthesizer for recombining the part

Sub
A1

of the plurality of components to which the digital watermark information is added with the remaining components of the color image data.

26. An image processing device according to Claim 24, wherein said color converter converts the gray-scale image data to a format where each pixel includes red, green, and blue components.

27. An image processing device according to Claim 26, wherein said color component extracting unit extracts the blue component and said embedding unit adds the digital watermark information to the blue component.

28. An image processing device according to Claim 24, wherein said color converter converts the gray-scale image data to a format where each pixel includes brightness and chrominance components.

29. An image processing device according to Claim 28, wherein said color component extracting unit extracts at least a part of the chrominance component and said embedding unit adds the digital watermark information to the extracted part of the chrominance component.

30. An image processing device according to Claim 28,
further comprising an encoder that compresses and encodes
the color image data including the brightness and
chrominance components.